Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

$$(y'^2-b^2)x^2+2x'x-(a^2y'^2+b^2x'^2)+c=0 \ldots\ldots (4),$$

and the condition that (4) has equal roots, or that the hyperbola touches the X-axis is given by $y'^2(a^2b^2-a^2y'^2-b^2x'^2)=c(b^2-y'^2) \ldots\ldots (5)$; and, in a similar way that the curve touches the Y-axis, $x'^2(a^2b^2-a^2y'^2-b^2x'^2)=c(a^2-x'^2) \ldots\ldots (6)$. $(5)\div(6)$ gives after reduction, $a^2y'^2-b^2x'^2=0 \ldots\ldots (7)$, showing that (x', y') is on an equi-conjugate axis of the ellipse.

Also solved by G. W. Greenwood, A. H. Holmes, W. W. Landis, J. Scheffer, and G. B. M. Zerr.

GROUP THEORY.

12. Proposed by **GEORGE H. HALLETT, Ph. D., Assistant Professor of Mathematics, The University of Pennsylvania.**

Given $U_1=\alpha'$, $V_1=\beta'$, and the recursion formulae $U_y=\alpha' V_{y-1}+\alpha'' U_{y-1}$, $V_y=\beta' V_{y-1}+\beta'' U_{y-1}$. Find expressions for U_y, V_y in terms of the coefficients α', α'', β', β''.

Solution by **PROFESSOR JAMES BYRNIE SHAW, The James Milliken University, Decatur, Ill.**

By eliminating V we find that U_n is the coefficient of x^n in the expansion of

$$\frac{\alpha' x}{1-(\alpha''+\beta')x+(\alpha''\beta'-\alpha'\beta'')x^2}.$$

Likewise we find that V_n is the coefficient of x^n in the expansion of

$$\frac{1-\alpha'' x}{1-(\alpha''+\beta')x+(\alpha''\beta'-\alpha'\beta'')x^2}.$$

We may state the result as follows: Let $\cos\theta=\frac{1}{2}.\frac{\alpha''+\beta'}{T}$ where $T^2=\begin{vmatrix} \alpha'' & \alpha' \\ \beta'' & \beta' \end{vmatrix}$. Then $V_n=\alpha'.T^{n-1}.\frac{\sin n\theta}{\sin\theta}$, and $V_n=T^n.\frac{\sin(n+1)\theta}{\sin\theta}-\alpha'' T^{n-1}\frac{\sin n\theta}{\sin\theta}$. These latter forms are easily verified by mathematical induction. The well-known formulae for $\frac{\sin n\theta}{\sin\theta}$ give U_n and V_n in terms of the coefficients directly, and free from irrationalities.

13. Proposed by **O. E. GLENN, Ph. D., Springfield, Mo.**

The order of the linear homogeneous group in n letters is $(p^n-1)(p^n-p) \ldots\ldots (p^n-p^{n-1})$. Two proofs are given in Burnside's ***Finite Groups***. Give other proofs.

Solution by the **PROPOSER.**

The linear homogeneous group is known to be equivalent to the group of isomorphisms of the abelian group $H_{p^n}=[P_1, P_2 \ldots\ldots P_n]$ of type $[1\ 1\ 1 \ldots\ldots]$,